

STORM WATER DRAINAGE REPORT

ATTIC STORAGE OF LEE'S SUMMIT

LOT 3B

DEERBROOK COMMERCIAL PARK

LEE'S SUMMIT, MISSOURI

920 NE DEERBROOK STREET

PREPARED FOR

STRICKLAND CONSTRUCTION

PREPARED BY

HG CONSULT, INC.

January 22, 2019

Project Overview

The proposed project is a speculative self storage building. The building will be contained in a 34,181 square foot building footprint with storage on three floors. This project is contained on a 2.54 acre site. The site is not construction ready. Additional storm sewer will be added to project to allow for proper drainage and the Flexstorm filter system will be added to the catch basins (one existing and one proposed) to filter all storm water that flows over all impervious areas. A detention pond is not proposed with this improvement plan.

The topography of the site is a steep slope from the south east to the north west. There is no existing storm sewer detention system in place for this site. The overall existing storm sewer system serves Lots 3A and 3B of Deerbrook Commercial Park. No detention is required with this development.

Drainage Assessment of the Project Site

Due to the slope of the site and the need for a flat slab, the bench and fill grading method with additional fill material to reduce the use of retaining walls was used for the site along with the need to have positive drainage away from the building and directing storm water into existing storm sewer catch basin and new storm sewer catch basin that allows for treatment of all storm water going over impervious areas. The remainder of the site grading directs pervious areas and impervious areas away from the building and drainage to existing creek on the north side of project development. Design requirements call for a piping system with a minimum capacity for the 10 year event, with the 100 year storm event being routed overland in an above grade manner such as swales and gutters. To insure that higher frequency storms would not cause any ponding problems or inundation of parked vehicles, the structures and piping system have been designed to the 100 year event flows. With the relatively small drainage areas, these flows are low and pipe sizes are 24 inch draining on the west side of building and an 18" opening from the catch basin to final grade on the east side.

Conveyance Design

As shown on the Preliminary Development Drainage Area Map for the site, all pervious areas drain to the existing catch basin on the west side of project by sheet flow over the parking and drive aisle area. This system generates a 10 year flow of 7.44 cfs and a 100 year flow of 10.49 cfs for pre-development flows.

As shown on the Post Development Drainage Area Map for the site, all areas drain to the existing catch basin (west side) and the proposed catch basin (east side) by sheet flow over the parking and drive aisle area and the building through a series of gutters and piping. This system generates a 10 year flow of 10.97 cfs and a 100 year flow of 15.47 cfs for post-development flows.

All pervious areas within drainage areas drain towards the existing catch basin and the proposed catch basin, which treats the water with the Flexstorm Inlet Filtering system to meet water quality requirements.

Temporary Erosion and Sediment Control

During construction and prior to paving, it will be necessary to control erosion and sediment from the site during storms within the construction timeframe. To insure that sediment does not enter the existing streams, perimeter containment is controlled by silt fence installation and inlet protection. To keep construction traffic from tracking mud onto the adjacent city street, a stabilized rock construction entrance will need to be installed. These erosion control devices, and their maintenance throughout the construction timeframe, are required by ordinance and the details for them are referenced by the City's Design and Construction Manual and shown on Detail Sheets 9 thru 11.

Post development water quality will be addressed through the use of the Flexstorm Inlet Filtering system. The owner will need to have a routine maintenance policy for the cleaning, repair and replacement of the filtering system.

Design Calculations

Design calculations for the Preliminary Development Drainage Area and the Post Development Drainage Area were calculated using the Rational formula, $Q=CIA$ and shown on respective sheets.

For Pre Development calculations:

$$Q = CIA$$

$$C = 0.40$$

$$I_{10} = 7.32, I_{100} = 10.32$$

$$A = 2.54 \text{ ac}$$

$$Q_{10} = 0.40 \times 7.32 \times 2.54 = 7.44 \text{ cfs}$$

$$Q_{100} = 0.40 \times 10.32 \times 2.54 = 10.49 \text{ cfs}$$

For Post Development calculations:

$$Q = CIA$$

$$C = 0.59$$

$$I_{10} = 7.32, I_{100} = 10.32$$

$$A = 2.54 \text{ ac}$$

$$Q_{10} = 0.59 \times 7.32 \times 2.54 = 10.97 \text{ cfs}$$

$$Q_{100} = 0.59 \times 10.32 \times 2.54 = 15.47 \text{ cfs}$$

Exhibits

Pre Development Drainage Map

Post Development Drainage Map

Flexstorm Information

This section is to address the Lee's Summit checklist for inclusion. **Response will be in bold.**

1. Preliminary Development Drainage Area Map:
(Including locations of all points of discharge from each sub-drainage area)
2. Post Development Drainage Area Map:
(Including locations of all points of discharge from each sub-drainage area)
3. Undetained Areas:
(No Detention is proposed with this submittal.)
4. Soil analysis, showing the soil type(s) predominant on the site:
(Attached soil analysis from USDA Natural Resources Conservation Web Soil Survey)
5. Time of concentration calculations:
(Time of concentration for all storm .water calculations was assumed to be 5 minutes)
6. Curve number assumptions:
With no detention, curve numbers were not needed in calculations. The rational method was used for all calculations.
7. Floodplain issues (if any):
There is a floodplain located at the north end of this site. The floodplain encroaches onto property in the far northwest corner of the property. No development is proposed for this area.
8. Wetland and USCOE issues:
No Wetland or USCOE issues are on this site.
9. Methodology used in the preparation of this report:
The rational method was used to determine the 10 and 100 year storm events and amount of flow.
10. Existing Conditions:
The existing conditions for this site includes a approximately 18,800 SF of parking and drive aisle (no existing buildings). The remainder of the site is pervious area with treed vegetation.
11. Proposed Conditions:
Upon final development of this site, a building will be proposed with parking and drive aisles for climate controlled storage.
No detention is proposed.
12. Future development:
No future development is planned at this time.
13. A discussion of the method used to comply with the water quality standard set forth in Section 5600 (i.e., 40 hour extended detention, or volumetric reduction credit, or combination thereof).
This method could not be employed as there is no detention. Using the Flexstorm Inlet Filters, this site meets the intent of the standards set forth in APWA/MARC BMP Manual.
14. The Time vs. Volume graph:
There is no detention provided with this submittal.

15. A discussion of all conclusions, including any waivers necessary to comply with the Design and Construction Manual.

This site is a partially developed site that is the last lot before reaching the stream bed. The detention requirement has been waived. This has been supported by Citystaff.

16. Explanation of the accounting procedure used to calculate the allowable release rate at key points shown on the drainage maps. In essence, if off-site contributors to drainage area are present in the existing condition drainage area map, then a percentage of their existing peak flow rate can be added to the allowable peak flow rate to the various drainage points of discharge.

No off-site areas are included or considered in this report.

17. A table showing how these drainage areas were accounted in the calculation of the allowable peak flow rate at the various drainage points of discharge.

All drainage areas discharge into the stream bed as shown and accounted for.

18. Final Report - Inflow hydrographs for the 2, 10, and 100 year storm events (please keep in mind that this information will be required to run the preliminary model, but not necessarily required in the preliminary report).

The 10 and 100 year storm events are included in this report and shown on Preliminary Development Drainage Area Map and the Post Development Drainage Area Map.

19. The maximum water surface elevation within the basin (normally the 100 year event).

Not applicable. There is no maximum water surface or detention pond.

20. Final Report: Stage-discharge-rating curves/data tables for each emergency spillway, primary outlet works and combined outlets and overflows.

Not applicable. There is no stage storage or detention requirements.

21. Final Report: Routing curves for all design storms with time plotted as the abscissa, and the following plotted as ordinates:

- a. Cumulative inflow volume
- b. Cumulative discharge
- c. Stage elevation
- d. Cumulative storage

No routing curves will be submitted with Final Report. No detention pond proposed.